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## Senior Military Officers' Educational Concerns, Motivators and Barriers for Healthful Eating and Regular Exercise

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The increasing trend of overweight in the military, the high cost of health care associated with overweight, and the failure to meet some Healthy People 2000 objectives related to diet identify the need for more appropriate nutrition and fitness education for military personnel. The purpose of this study was to assess senior military officers' concerns on various health topics, educational preferences for nutrition and health topics, eating habits, and barriers and motivators for eating healthfully and exercising regularly. The survey was completed by 52 resident students at the U.S. Army War College. Fitness, weight, and blood cholesterol were top health concerns, and respondents wanted to know more about eating healthfully on the run. The primary barrier to eating healthfully and exercising regularly was lack of time, whereas health and appearance were top motivators. Health interventions for this population should include their topics of concern and should address perceived barriers and motivators.

### Introduction

Health promotion and military readiness are top priorities in the U.S. military. The 2003 update of Health Promotion Directive 1010.10 continues to "establish the Department of Defense requirement to implement health promotion and disease and injury prevention programs to improve and sustain military readiness and the health, fitness, and quality of life of military personnel, Department of Defense personnel, and other beneficiaries."<sup>1</sup> A goal of the Health Promotion Directive is to "enhance mission readiness, unit performance, and the health and fitness of military personnel, beneficiaries, and civilian employees through the creation of a culture within the Department of Defense that values health and fitness and empowers individuals and organizations to actualize those values and achieve optimal health."<sup>1</sup>

Physical activity and diet are major factors that influence morbidity and mortality rates in the United States.<sup>2-5</sup> Sixty-four percent of U.S. adults are overweight or obese, as defined by a body mass index of  $>25.0$  kg/m<sup>2</sup>, an increase of  $>25\%$  in the past three decades.<sup>6</sup> Additionally, one-fourth of U.S. adults do not engage in any leisure-time physical activity.<sup>7</sup> According to the 2002 Department of Defense Survey of Health-Related Behaviors among Military Personnel, 58.4% of military personnel  $\geq 20$  years of age were classified as overweight, an increase of 8% from the 1995 survey.<sup>8</sup> Excess body weight incurs significant costs to the military, in terms of both direct costs for increased health care and indirect costs for lost workdays. Total estimated

costs (including direct and indirect costs) associated with overweight in the Air Force were \$22.8 million in 1997, whereas the total annual cost to the U.S. Navy for obesity-related inpatient care was expected to be \$5.8 million in 1998 dollars.<sup>9,10</sup>

Numerous studies have shown a strong association between a healthy diet and a lower risk for cardiovascular disease, obesity, and certain cancers.<sup>11-13</sup> Specific national recommendations include restricting total fat to  $\leq 30\%$  of energy intake and consuming a minimum of five servings of fruits and vegetables daily.<sup>14,15</sup> Yet, only 34% of U.S. adults report consuming the recommended  $\leq 30\%$  of calories from fat and 35% report consuming five or more servings of fruits and vegetables per day.<sup>2</sup> A review of the health habits of U.S. Army personnel revealed that Healthy People 2000 goals were not met for dietary fat and sodium intake, tobacco use, and seat belt use.<sup>16</sup>

Emphasis has been placed on evaluation and improvement of the health and physical fitness of military personnel since the inception of Department of Defense Directive 1308.1 Physical Fitness and Body Fat Program in 1981.<sup>17</sup> The senior service colleges at the National Defense University in Washington, DC, and the U.S. Army War College (USAWC) in Carlisle, Pennsylvania, have been conducting health and fitness programs for senior military officers attending these courses. In general, senior male military officers who participated in these programs were normotensive and nonobese, had a high aerobic capacity, and were at low risk for developing cardiovascular disease.<sup>18,19</sup> Senior female military officers were reported as being more fit and having lower cardiovascular risk factors than their civilian counterparts attending the USAWC.<sup>20</sup> However, in the 1996 Army Food and Nutrition Survey, 55% of officers reported consuming less than two servings of fruits per day and  $\sim 87\%$  consumed less than three servings of vegetables per day.<sup>21</sup> When military personnel were asked whether they thought their diet was too low, too high, or just about right for fat content, 55% of male personnel and 57% of female personnel in the  $\geq 40$ -year age group reported that they thought their diet was too high in fat.<sup>17</sup> When asked about attitudes on diet, 46% of all military personnel surveyed thought that it was very important to have a diet low in saturated fat and 51% thought that it was very important to have a diet with plenty of fruits and vegetables.

The increasing trend of overweight in the military, the high cost of health care associated with overweight, the failure to meet key Healthy People 2000 objectives related to diet (such as fat and sodium intake), and service members' beliefs about their diets identify the need for more appropriate nutrition and fitness education for military personnel. In general, educational interventions are more effective when they are tailored to the needs and preferences of the target population.<sup>22</sup> However, educational preferences of various segments of the military have not been reported in the literature. This article identifies the health

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concerns, educational preferences for nutrition and fitness, barriers and motivators for eating healthfully and exercising regularly, and eating habits of senior military officers enrolled in the residence course at the USAWC. This information can aid in the development of targeted educational programs for this population.

### Methods

A Nutrition and Fitness Educational Needs Assessment Survey was developed and validated to assess senior military officers' concerns on various health topics, educational preferences for nutrition and health topics, eating habits, and barriers and motivators for eating healthfully and exercising regularly. It was given to resident students enrolled in the academic year 2002 USAWC course at Carlisle, Pennsylvania.

Approval to survey the resident students was obtained from the Colorado State University Human Research Committee and the Director of Institutional Assessment at USAWC. The survey and a cover letter describing the purpose of the study and point of contact were sent electronically to 292 active duty U.S. military officers. A consent form was not necessary because the study was given exempt status by Colorado State University. Completion of the survey was voluntary but not completely anonymous because completed surveys were sent electronically to the investigators. However, confidentiality was maintained by not reporting and identifying individual responses.

The survey consisted of 15 questions. The first four questions were related to demographic data and included age, gender, military status, and marital status. Six questions measured respondents' attitudes, on a 5-point Likert scale from strongly agree to strongly disagree, regarding their health concerns, educational topics they wanted to know more about, and barriers and motivators for eating healthfully and exercising regularly. Additionally, respondents were asked to subjectively rate both their eating habits and fitness levels as excellent, good, fair, needs improvement, or poor and were asked specific questions about the number of times they dined out each week and the number of days per week they consumed breakfast and lunch. Descriptive analyses were performed with Statistical Package for the Social Sciences, version 11.5 (SPSS, Chicago, Illinois), by calculating mean scores for the attitude responses and computing frequencies and percentages for all responses.

### Results

Fifty-eight USAWC resident students completed and returned the needs assessment survey, for a return rate of 20%. Of the students who completed the survey, 93% were male, 88% were between the ages of 40 and 50 years, and 90% were married. Respondents reported being in the U.S. Army (76%), U.S. Air Force (9%), Army Reserves (7%), and U.S. Marine Corps (3%). Respondents' survey answers and mean scores are listed in Table I.

Ninety-eight percent of respondents strongly agreed or agreed that fitness was their primary health concern, followed closely by weight (95%). Senior military officers were also concerned with their body fat (90%), blood cholesterol (86%), and blood pressure (79%). Cancer (68%) and diabetes (43%) were less important health concerns.

Eighty percent of respondents wanted more information on

eating healthfully on the run and 78% wanted to learn more about lowering/controlling their blood cholesterol. Senior military officers also reported that they wanted to learn how to lower/control their blood pressure (65%). Almost three-fourths of respondents reported "being too busy" as the primary barrier to eating healthfully. Forty-two percent reported that they did not make healthful eating a personal priority, whereas nearly one-third agreed that the nonavailability of healthy food choices, a dislike for cooking, and confusion from the media/research were also barriers to eating healthfully. Appearance (97%) and health (95%) were the leading motivators for eating healthfully. Meeting military weight and/or body fat standards (84%) was also reported frequently as a motivator, followed closely by family (83%).

Fifty-seven percent of respondents reported being too busy as the primary barrier to maintaining a regular exercise program. A dislike for exercise (20%) and the nonavailability of a fitness facility within close proximity (18%) were also reported. Concern for appearance/weight (98%) was the primary motivator for exercising regularly. Eighty-six percent of respondents reported passing required physical fitness tests and achieving personal fitness goals as motivators also.

Personal ratings of eating habits and fitness levels revealed that 22% of senior military officers perceived themselves as having an excellent level of fitness, whereas only 9% thought that they had excellent eating habits (Table II). A small proportion of respondents thought that they should improve eating habits and fitness levels, and none of them thought that their eating habits or fitness levels were poor. In evaluating senior military officers' eating habits, almost one-half of the respondents (47%) reported eating breakfast 7 days per week, whereas 35% reported eating lunch 7 days per week (Fig. 1). Sixty-six percent of respondents reported dining out  $\leq 2$  days per week and 33% reported dining out 3 to 5 days per week.

### Discussion

Findings from this study revealed that senior military officers were most concerned with fitness, weight, and body fat. Military regulations governing fitness and weight may be the impetus for these concerns since noncompliance can result in military discharge. Despite the enforcement of weight and body fat standards, overweight prevalence among military service members is on the rise. Body mass index among military personnel has increased over the past several years.<sup>8</sup> Therefore, it is not surprising that these respondents were concerned with weight and body fat, especially when their military careers at stake.

Cholesterol and blood pressure were also frequently reported health concerns. This may be because cholesterol and blood pressure readings are routine measurements in mandatory physical examinations and therefore service members are more aware of cholesterol and blood pressure values than risk factors for other chronic diseases. Another potential reason for these concerns is that the officers surveyed might have been more knowledgeable about cholesterol and blood pressure values than other senior officers because they participated in the health and fitness program offered by the Army Physical Fitness Research Institute (APFRI) during the USAWC course. The pro-

TABLE 1  
PERCENTAGE OF RESPONSES BY SENIOR MILITARY OFFICERS REGARDING HEALTH CONCERNS, EDUCATIONAL PREFERENCES, AND  
MOTIVATORS AND BARRIERS TO HEALTHFUL EATING AND REGULAR EXERCISE

Question	% (n) <sup>a</sup>					Mean Score <sup>b</sup>
	Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree	
Health concerns						
Blood cholesterol	45 (26)	41 (24)	10 (6)	3 (2)	0	4.3
Blood pressure <sup>c</sup>	38 (22)	41 (24)	9 (5)	9 (5)	2 (1)	4.1
Body fat <sup>c</sup>	43 (25)	47 (27)	7 (4)	2 (1)	0	4.3
Cancer <sup>c</sup>	33 (19)	35 (20)	19 (11)	10 (6)	2 (1)	3.9
Diabetes	22 (13)	21 (12)	28 (16)	22 (13)	7 (4)	3.3
Fitness <sup>c</sup>	67 (39)	31 (18)	0	0	0	4.7
Weight <sup>c</sup>	59 (34)	36 (21)	3 (2)	0	0	4.6
Wants to know more about						
Benefits of dietary fiber	12 (7)	43 (25)	40 (23)	5 (3)	0	3.6
Dieting/weight loss/fad diets	14 (8)	41 (24)	26 (15)	17 (10)	2 (1)	3.5
Eating healthfully on the run	35 (20)	45 (26)	17 (10)	3 (2)	0	4.1
How to lower/control blood cholesterol <sup>c</sup>	31 (18)	47 (27)	12 (7)	9 (5)	0	4.0
How to lower/control blood pressure	17 (10)	48 (28)	24 (14)	10 (6)	0	3.7
Reading food labels	7 (4)	33 (19)	45 (26)	14 (8)	2 (1)	3.3
Safety and use of dietary supplements	16 (9)	36 (21)	24 (14)	21 (12)	3 (2)	3.4
Barriers to eating healthfully						
Too busy	28 (16)	45 (26)	12 (7)	14 (8)	2 (1)	3.8
Not a personal priority	9 (5)	33 (19)	9 (5)	45 (26)	5 (3)	3.0
Lack of knowledge; not sure what to eat	9 (5)	10 (6)	19 (11)	57 (33)	5 (3)	2.6
Healthful food choices not available	3 (2)	29 (17)	21 (12)	38 (22)	9 (5)	2.8
Confusion from the media/research	2 (1)	28 (16)	22 (13)	40 (23)	9 (5)	2.7
Do not like to cook	9 (5)	22 (13)	21 (12)	40 (23)	9 (5)	2.8
Motivators to eating healthfully						
My health	48 (28)	47 (27)	5 (3)	0	0	4.4
My appearance	45 (26)	52 (30)	3 (2)	0	0	4.4
Meeting weight and/or body fat standards	43 (25)	41 (24)	12 (7)	2 (1)	2 (1)	4.2
My family	35 (20)	48 (28)	12 (7)	3 (2)	2 (1)	4.1
My personal medical history/advice by health care provider	22 (13)	38 (22)	28 (16)	9 (5)	3 (2)	3.7
Support from family/friends/coworkers	9 (5)	33 (19)	36 (21)	21 (12)	2 (1)	3.3
Barriers to exercising regularly						
Too busy	19 (11)	38 (22)	9 (5)	26 (15)	9 (5)	3.3
Lack of knowledge	0	5 (3)	19 (11)	48 (28)	28 (16)	2.0
Fitness facility is not in close proximity	2 (1)	16 (9)	19 (11)	43 (25)	21 (12)	2.3
Do not like to exercise	3 (2)	17 (10)	26 (15)	21 (12)	33 (19)	2.4
Motivators to exercising regularly						
My appearance/weight	41 (24)	57 (33)	2 (1)	0	0	4.4
My military career; passing the fitness test	41 (24)	45 (26)	10 (6)	2 (1)	2 (1)	4.2
Achievement of personal fitness goals	29 (17)	57 (33)	12 (7)	2 (1)	0	4.1
My personal medical history/advice by health care provider	9 (5)	50 (29)	19 (11)	17 (10)	5 (3)	3.4
Support from family/friends/coworkers	9 (5)	31 (18)	33 (19)	26 (15)	2 (1)	3.2

<sup>a</sup> N = 58.

<sup>b</sup> Mean score based on range from 5 to 1 (5 = strongly agree; 4 = agree; 3 = neither agree nor disagree; 2 = disagree; 1 = strongly disagree).

<sup>c</sup> Percent and mean score based on N = 57.

TABLE II  
SENIOR MILITARY OFFICERS' PERSONAL PERCEPTIONS OF EATING HABITS AND FITNESS LEVELS

	%				
	Excellent	Good	Fair	Needs Improvement	Poor
Eating habits	9	60	21	10	0
Fitness level	22	50	19	9	0

<sup>a</sup>N = 58.

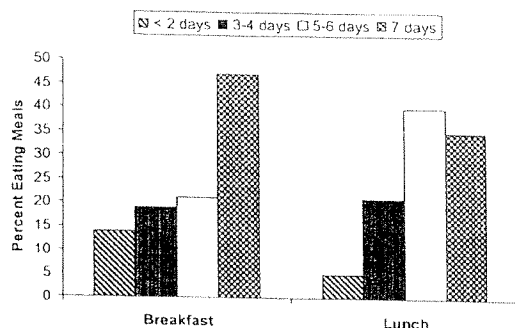


Fig. 1. Percentage of senior military officers who reported eating breakfast and lunch (N = 58).

gram educates officers on cardiovascular disease risk factors and offers classes on controlling cholesterol and blood pressure levels.

The first topic that respondents wanted to know more about was how to eat healthfully on the run. Considering the fact that senior officers have fast-paced, executive lifestyles, it is not surprising that they perceive there is little time during the day to eat healthfully. How to lower/control blood cholesterol and blood pressure were the second and third topics, respectively, that respondents wanted to know more about. The desire to know more about these topics may also be the result of participation in the APFRI program because students are made aware of their cholesterol and blood pressure levels, guidelines for normal values, and potential consequences of high cholesterol and blood pressure levels.

Interestingly, respondents reported that learning about cholesterol and blood pressure control was more important than education on dieting, weight loss, and fad diets, although weight was their second health concern. One could argue that a desire for information on weight loss should coincide with the officers' concerns regarding weight and body fat. One explanation for the disparate results may be that they do not want education on how to diet or lose weight as much as they want education on how to "control weight"; therefore, changing the educational topic to "weight control" may increase interest. Also, military officers may think they are knowledgeable on how to lose and/or control weight.

Being too busy was the primary barrier that prevented respondents from eating healthfully. This finding supports a study conducted with the Oregon Air National Guard, in which lack of time was the most commonly cited barrier to making positive health behavior changes.<sup>23</sup> Although appearance and health were the major motivators to eating healthfully and respondents were concerned about their weight, they reported

that they did not make eating healthfully a personal priority. It appears that their busy schedules and lack of time outweigh any personal perceived benefits of eating healthfully. Because officers did not report knowledge as a major barrier to eating healthfully, they may know what to eat but view healthy eating as a time-consuming event.

Being too busy was also the primary barrier that prevented senior military officers from engaging in regular exercise, whereas appearance/weight and achievement of both military physical fitness standards and personal fitness goals were top motivators for exercise. The perception of time as a barrier to exercising regularly is consistent with previous studies identifying barriers to physical activity.<sup>24-26</sup> Although exercise is an essential part of military culture, one-fifth of the respondents reported that they did not like to exercise. Not one respondent thought that lack of knowledge was a barrier to exercise, which may be reflective of the presence of military physical fitness policies and programs. Again, military regulations governing fitness and weight may be the driving force that motivates these officers to exercise regularly, surpassing any motivating influences triggered by their personal medical history, advice from a health care provider, or support from family/friends/coworkers. Some officers were motivated to exercise to achieve personal fitness goals that may or may not be related to the physical fitness test requirements, such as meeting minimum testing requirements or surpassing the maximum standards.

Although the majority of respondents perceived their eating habits as good, there is some argument regarding whether an individual's perception of diet is an accurate reflection of dietary intake. A report of perceived healthy eaters, compared with an objective assessment of their diets, found that 50% of subjects who perceived themselves as eating a healthy diet had an objectively unhealthy diet, whereas 51% of the perceived unhealthy eaters had an objectively healthy diet.<sup>27</sup> These disparate results support the fact that every individual has a different interpretation of what defines a healthy diet and "healthy diet" is a general term that can include various components, such as fat, fruits and vegetables, sodium, and fiber. This survey asked subjects to rate their "eating habits," which could potentially invoke a variety of interpretations in addition to those listed previously, such as meal pattern consumption, eating three meals per day, skipping meals, late night snacking, bingeing, and dieting. Therefore, it is difficult to accurately assess senior military officers' dietary intake without an objective dietary evaluation.

Almost one-half of senior military officers consumed breakfast daily, and approximately one-third consumed lunch every day. The Army Food and Nutrition Survey found that 19% of male personnel  $\geq 40$  years of age "always/usually" skipped breakfast, whereas one-fourth of female personnel reported skipping this meal.<sup>21</sup> Nine percent of male personnel and 11% of female personnel  $\geq 40$  years of age reported "always/usually" skipping lunch. Meal skipping was prevalent in this senior officer population even though they were stationed at the USAWC, where there was a cafeteria in the academic building that served breakfast and lunch. Additionally, many students lived within 1 mile of the USAWC and had quick access to meals at home or at the USAWC. It appears that many officers continued to skip meals even when provided with a more flexible school environment and access to food.

More senior officers perceived themselves to have excellent fitness levels than excellent eating habits. This could again be related to military fitness policies that directly influence the physical activity habits of military personnel, including encouragement of physical training time during the workday (when feasible), annual physical fitness testing, and compliance with physical training regulations.

### Limitations

The small sample size and the low survey return rate limit the results of this study. Students who completed the survey might have been more concerned with health than students who did not respond; therefore, these results may not be generalizable to the senior military officer population. Also, the survey provided a limited number of specific answers and did not allow respondents to supply additional comments, which could have potentially restricted the answers to the survey. The fact that the subjects were enrolled in the resident course at the USAWC might have biased the results, because they were living in a school environment that was different from the typical military assignment. Lastly, the survey was administered in March, which was three-fourths of the way through the USAWC course; therefore, exposure to the APFRI health education program could have biased the students' answers.

### Conclusions

This is the first investigation targeting the senior officer population to identify their health concerns, educational preferences and perceived motivators and barriers for eating healthfully and exercising regularly. It is imperative that educational strategies consider the audience's characteristics, including their demographic characteristics, nutritional needs and preferences, and perceived motivators and barriers for the targeted behavior(s). On the basis of the results of this needs assessment, a nutrition and fitness intervention for this group of senior military officers should emphasize fitness, weight, body fat, control of blood cholesterol and blood pressure, and eating healthfully on the run. An effective intervention should address the lack of time that these officers perceive as the major barrier to a healthy diet and a regular exercise program and provide them with simple, reality-based, appropriate education that encourages adoption of positive eating and exercise behaviors.

Future research should assess the health concerns and perceived motivators and barriers for eating healthfully and exercising regularly of other military populations, such as younger enlisted personnel and younger officers (male and female) and special groups such as Special Forces or Rangers. An objective assessment of the target audience's dietary intake and physical activity patterns would also be beneficial in determining the behavioral goals of the target group. The health promotion intervention should be tailored to the specific needs and preferences of the target group.

### References

1. Department of Defense: Health Promotion Directive 1010.10, 2003. Available at <http://www.dtic.mil/whs/directives/corres/pdf2/d101010p.pdf>; accessed October 28, 2003.
2. Berrigan D, Dodd K, Troiano R, Krebs-Smith S, Barbash R: Patterns of health behavior in U.S. adults. *Prev Med* 2003; 36: 615-23.
3. Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion: Physical Activity and Health: A Report of the Surgeon General. Washington, DC, Government Printing Office, 1996.
4. Centers for Disease Control and Prevention: Chartbook on Trends in the Health of Americans, 2003. Available at <http://www.cdc.gov/nchs/hus.htm>; accessed November 5, 2003.
5. Must A, Spadano J, Coakley E, Field A, Colditz G, Dietz W: The disease burden associated with overweight and obesity. *JAMA* 2003; 282: 1523-9.
6. Flegal M, Carroll R, Kuczmarski R, Johnson C: Overweight and obesity in the United States: prevalence and trends, 1960-1994. *Int J Obes Relat Metab Disord* 1998; 22: 39-47.
7. Mokdad A, Ford E, Bowman B, et al: Prevalence of obesity, diabetes, and obesity-related health risk factors, 2001. *JAMA* 2003; 289: 76-9.
8. Bray R, Hourani L, Rae K, et al: 2002 Department of Defense Survey of Health-Related Behaviors among Military Personnel. Available at <http://www.tricare.osd.mil/main/news/art0514.html>; accessed May 3, 2004.
9. Robbins A, Chao S, Russ C, Fonseca V: Costs of excess body weight among active duty personnel, U.S. Air Force, 1997. *Milit Med* 2002; 167: 393-7.
10. Bradham D, South B, Saunders H, Heuser M, Pane K, Dennis K: Obesity-related hospitalization costs to the U.S. Navy, 1993 to 1998. *Milit Med* 2001; 166: 1-10.
11. Serdula M, Byers T, Mokdad A, Simoes E, Mendlein J, Coates R: The association between fruit and vegetable intake and chronic disease risk factors. *Epidemiology* 1996; 7: 161-5.
12. Steffen L, Jacobs D, Stevens J, Shahar E, Carithers T, Folsom A: Associations of whole-grain, refined-grain, and fruit and vegetable consumption with risks of all-cause mortality and incident coronary artery disease and ischemic stroke: the Atherosclerosis Risk in Communities (ARIC) Study. *Am J Clin Nutr* 2003; 78: 383-90.
13. Trichopoulou A, Naska A, Antoniou A, Friel S, Trygg K, Turrini A: Vegetable and fruit: the evidence in their favour and the public health perspective. *Int J Vit Nutr Res* 2003; 73: 63-9.
14. Krause R, Eckel R, Howard B, et al: American Heart Association dietary guidelines revision 2000: a statement for health care professionals from the Nutrition Committee of the AHA. *Circulation* 2000; 102: 296-311.
15. U.S. Department of Agriculture, U.S. Department of Health and Human Services: Nutrition and Your Health: Dietary Guidelines for Americans, Ed. 5. Home and Garden Bulletin 232. Washington, DC, Government Printing Office, 2000.
16. Yore M, Bell N, Senior L, Amoroso P: Progress toward attainment of the Healthy People 2000 objectives in the U.S. Army. *Am J Prev Med* 2000; 19: 87-93.
17. Department of Defense: Physical Fitness and Body Fat Program Directive 1308.1, 1995. Available at <http://www.dtic.mil/whs/directives/corres/pdf2/d13081p.pdf>; accessed November 22, 2003.
18. Wright D, Knapik J, Bielenda C, Zoltick J: Physical fitness and cardiovascular disease risk factors in senior military officers. *Milit Med* 1994; 159: 60-3.
19. Deuster P, Holland J, Montgomery L, Cowan M, Gilstad D, Newman R: Health and fitness profiles of male military officers. *Milit Med* 1987; 152: 290-3.
20. Bielenda C, Knapik J, Wright D: Physical fitness and cardiovascular disease risk factors of female senior U.S. military officers and federal employees. *Milit Med* 1993; 158: 177-81.
21. Warber J, McGraw S, Kramer F, Lesher L, Johnson W, Cline A: Army Food and Nutrition Survey, 1995-1997. Technical Report T00 6. Natick, MA, U.S. Army Medical Research and Materiel Command, 1999.
22. Contento I, Balch G, Bronner Y, et al: The effectiveness of nutrition education and implications for nutrition education policy, programs, and research: a review of research: executive summary. *J Nutr Educ* 1995; 27: 279-83.
23. Salvesson C, Messecar D, Monkong S: Feasibility of a virtual health and wellness center for the Oregon Air National Guard. *Milit Med* 2002; 167: 38-43.
24. Marcus B, Rakowski W, Rossi J: Assessing motivational readiness and decision making for exercise. *Health Psychol* 1992; 11: 257-61.
25. Stutts W: Physical activity determinants in adults. *AAOHN J* 2002; 50: 499-507.
26. Nelson M, Gordon M: Physical activity determinants of military health care recipients. *Milit Med* 2003; 168: 212-8.
27. Povey R, Conner M, Sparks P, James R, Shepherd R: Interpretations of healthy and unhealthy eating and implications for dietary change. *Health Educ Res* 1998; 13: 171-83.